Open data for climate impact modeling in Poland: geoportal ClimateImpact.sggw.pl

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The goal of the Geoportal:

– Spatial, interactive visualization of observed and projected climate change and its impacts in selected sectors

- Promotion and dissemination of results of CHASE-PL project
- Providing data for science and education

Potential users:

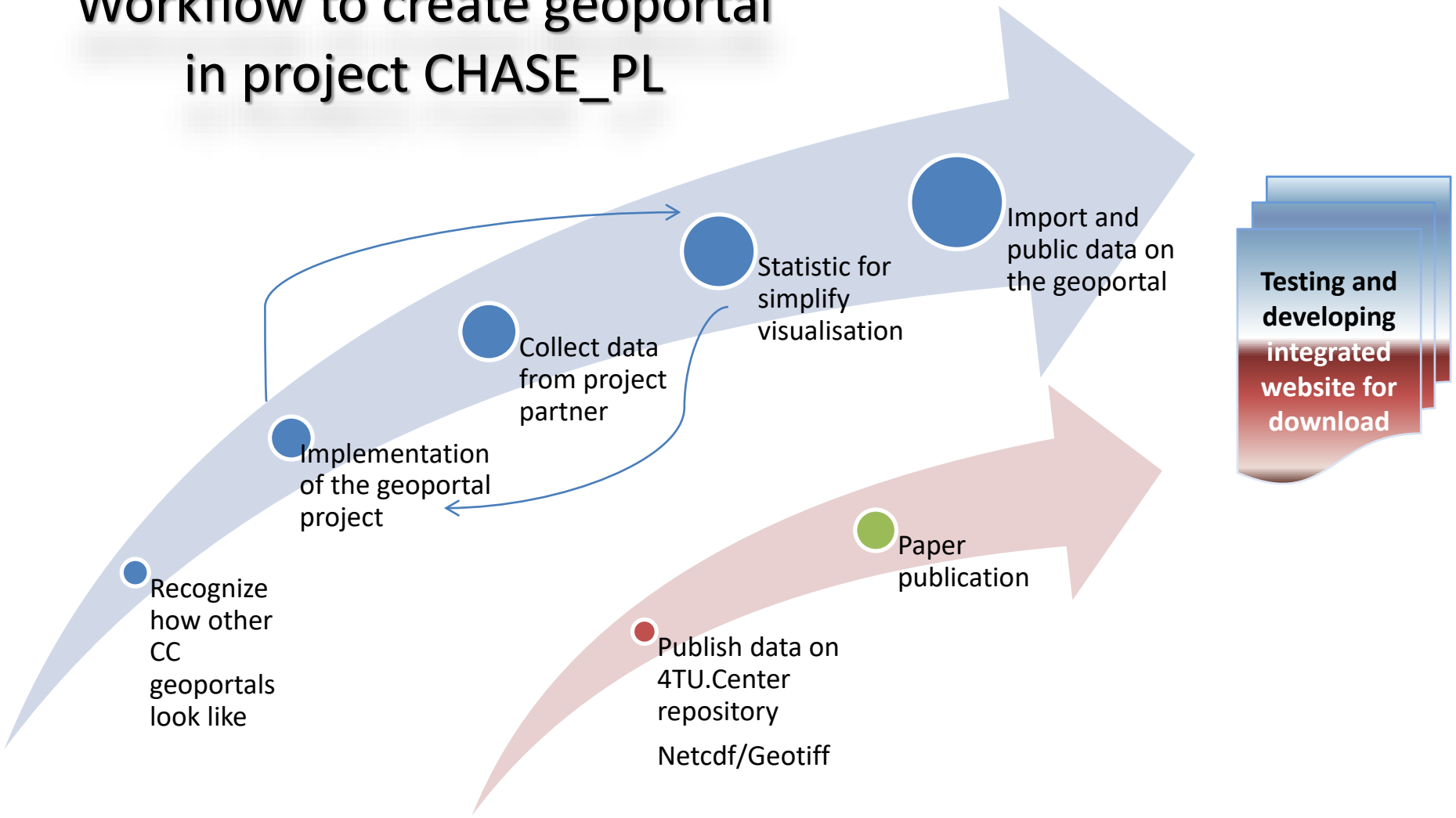
- Scientists
- Students
- High school students
- Media
- Public administration
- ???

http://ClimateImpact.sggw.pl

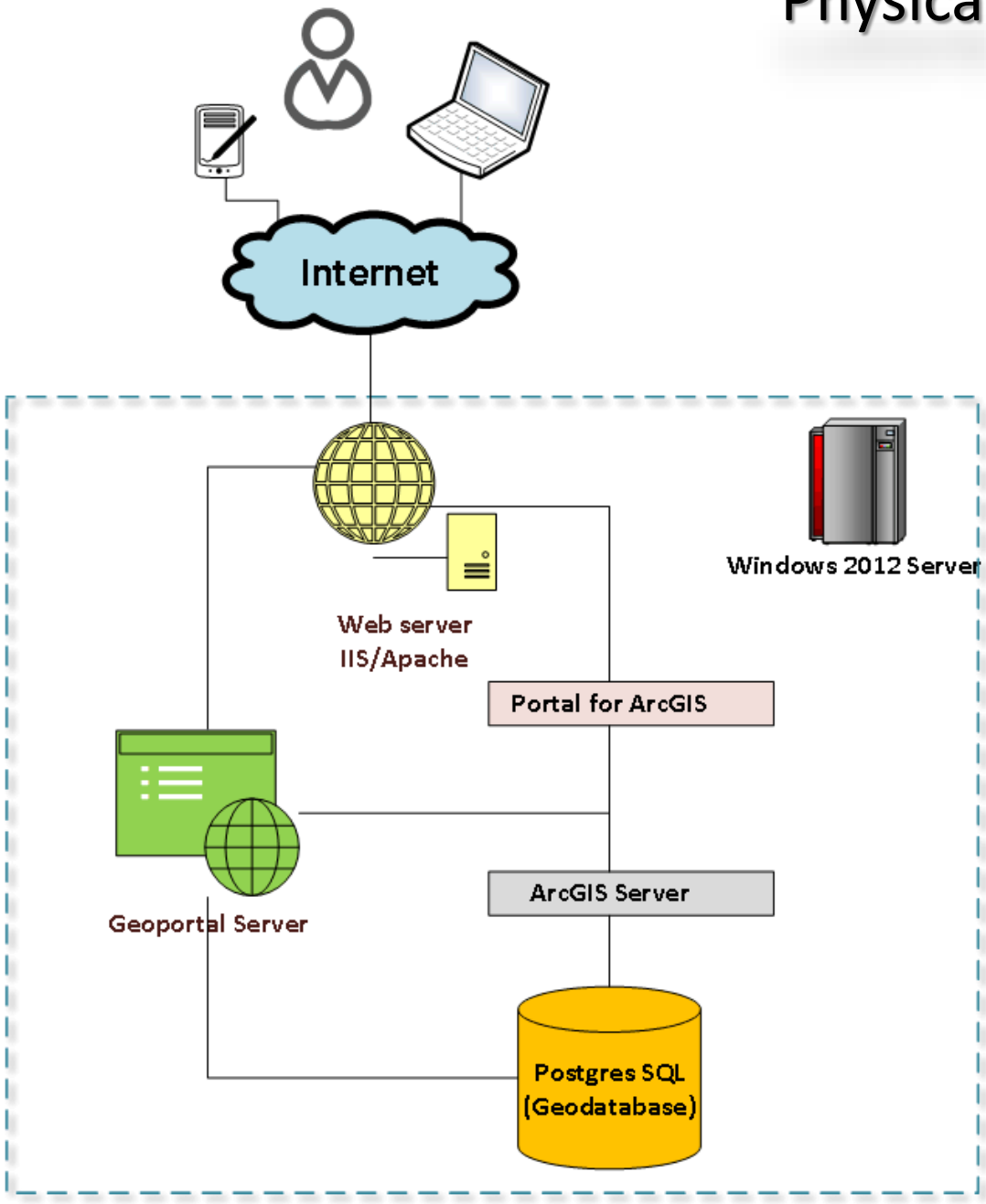
Contents

- Workflow
- Structure
- Functionality
- How to develop input (scientific basis)
- Presentation of the site
- Data download

Workflow to create geoportal in project CHASE_PL



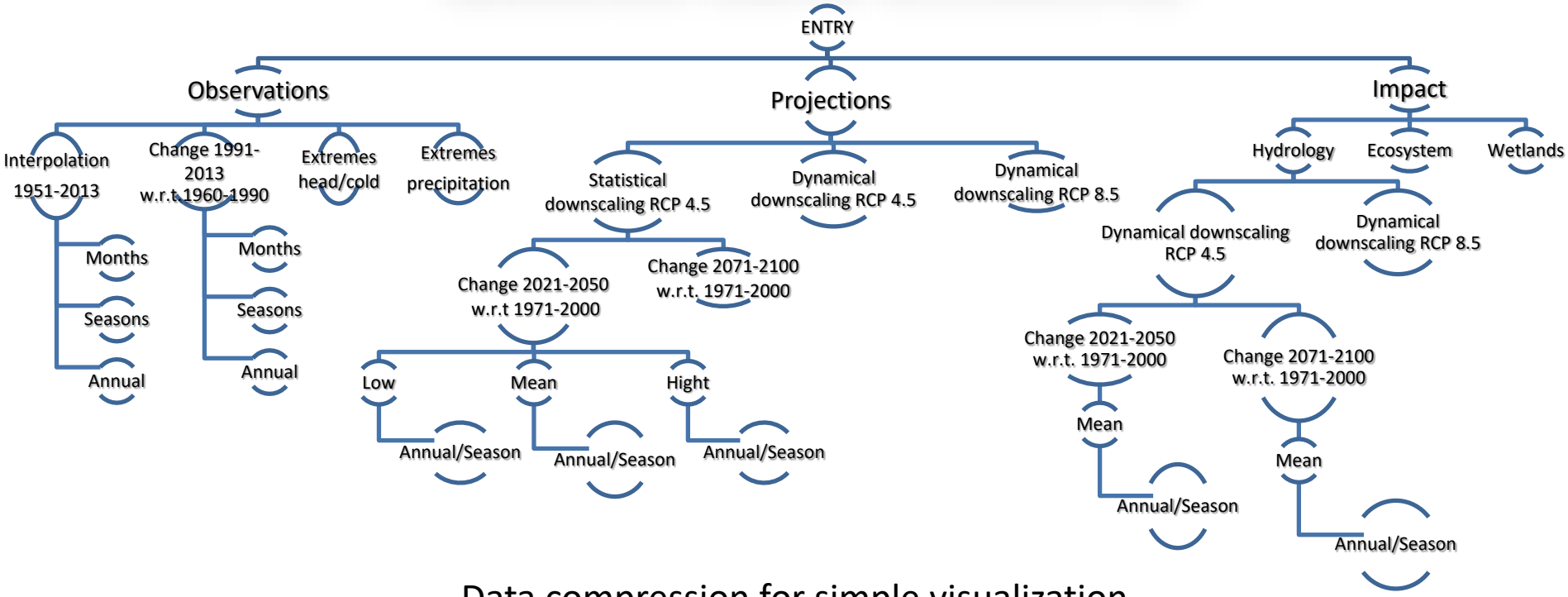
Physical architecture of the geoportal



Components:

- Virtual machine running on Windows Server 2012
- Esri Geoportal Server 1.2.6
- ArcGIS Server 10.3
- Apache Web Server
- Portal for ArcGIS
- Webmap App base on JavaScript frameworks
- Postgres SQL

Webmaps logical architecture



Data compression for simple visualization

	Rasters/points maps	Rasters/points maps	Poligons/line attributes
Input:	69 000	7 mln	613 000
Output:	3 100	150	280

Data sources

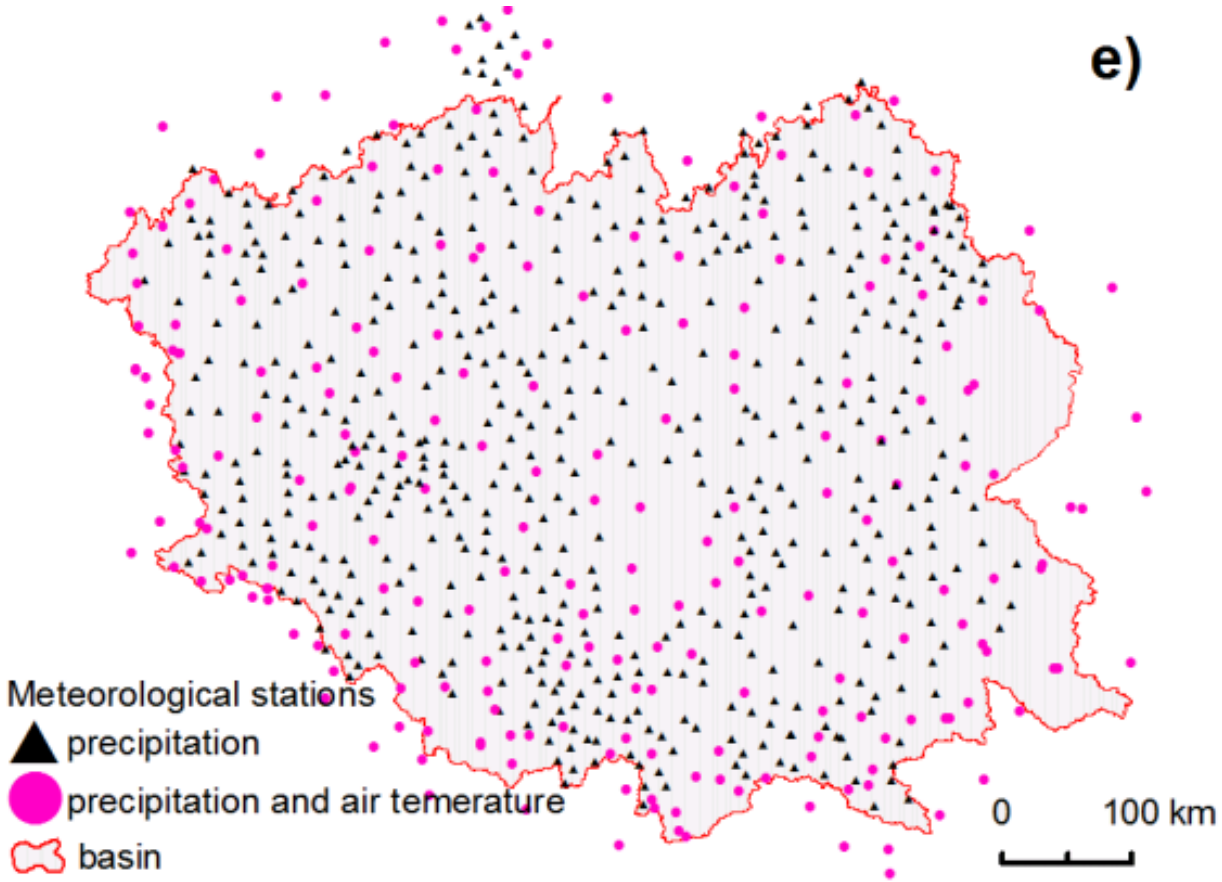
From CHASE-PL project: Climate change impact assessment for selected sectors in Poland

http://www.chase-pl.pl

Developed by the following partners:

- Polish Academy of Sciences in Poznań
- Warsaw University of Life Sciences - SGGW
- MET Norway (Oslo)

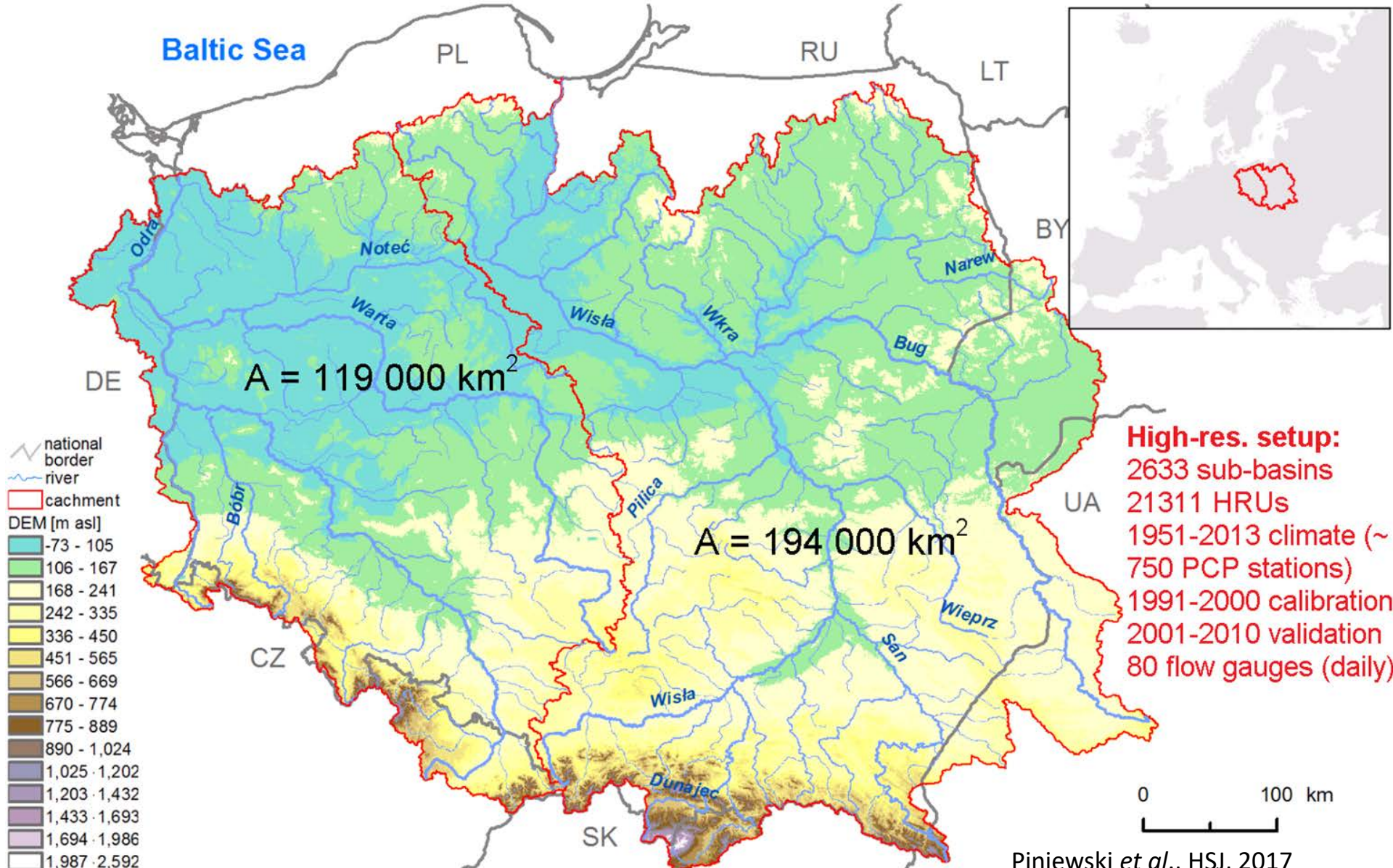
Climatic **OBSERVATION** come from Institute of Meteorology and Water Management



- A 5-km daily grid of temperature and rainfall data (CPLFD-GDPT5) has been developed and released.

Berezowski *et al.*, ESSD, 2016

Hydrological **SIMULATIONS** were developed using SWAT



Piniewski *et al.*, HSJ, 2017

Climate change projections

- Bias-corrected RCM climate projections
  - 9 climate model simulations
  - 2 RCPs: 4.5 and 8.5
  - Reference period 1971-2000, 2 future horizons 2021-2050 (near future, **NF**), 2071-2100 (far future, **FF**)

N	Global Climate Model			Regional Climate Model	
	Institute	Model	Run	Institute	Model
1	CNRM-CERFACS	CNRM-CM5	r1i1p1	CLMcom	CCLM4-8-17
2	CNRM-CERFACS	CNRM-CM5	r1i1p1	SMHI	RCA4
3	ICHEC	EC-EARTH	r12i1p1	CLMcom	CCLM4-8-17
4	ICHEC	EC-EARTH	r12i1p1	SMHI	RCA4
5	ICHEC	EC-EARTH	r1i1p1	KNMI	RACMO22E
6	ICHEC	EC-EARTH	r3i1p1	DMI	HIRHAM5
7	IPSL	IPSL-CM5A-MR	r1i1p1	SMHI	RCA4
8	MPI-M	MPI-ESM-LR	r1i1p1	CLMcom	CCLM4-8-17
9	MPI-M	MPI-ESM-LR	r1i1p1	SMHI	RCA4

Mezghani *et al.*, 2017, ESSD

Functionalities

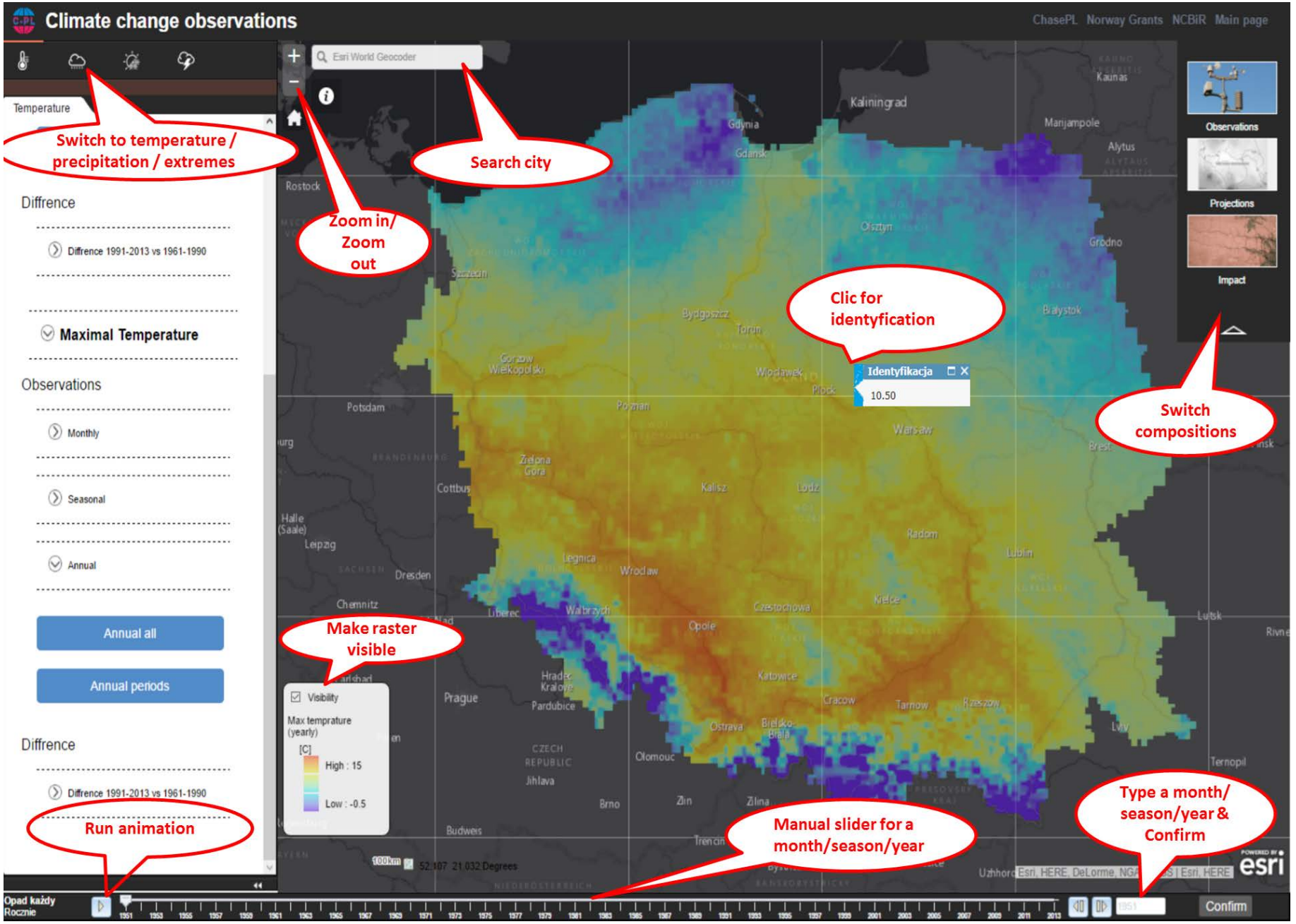
- Search for data in metadata service
- Downloading source data (source)
- Two languages versions - Polish and English
- Identification of values on the map
- The ability to compose two maps
- Transparency control
- Color scale control (vector layers)
- Search by towns

http://wplywklimatu.sggw.pl

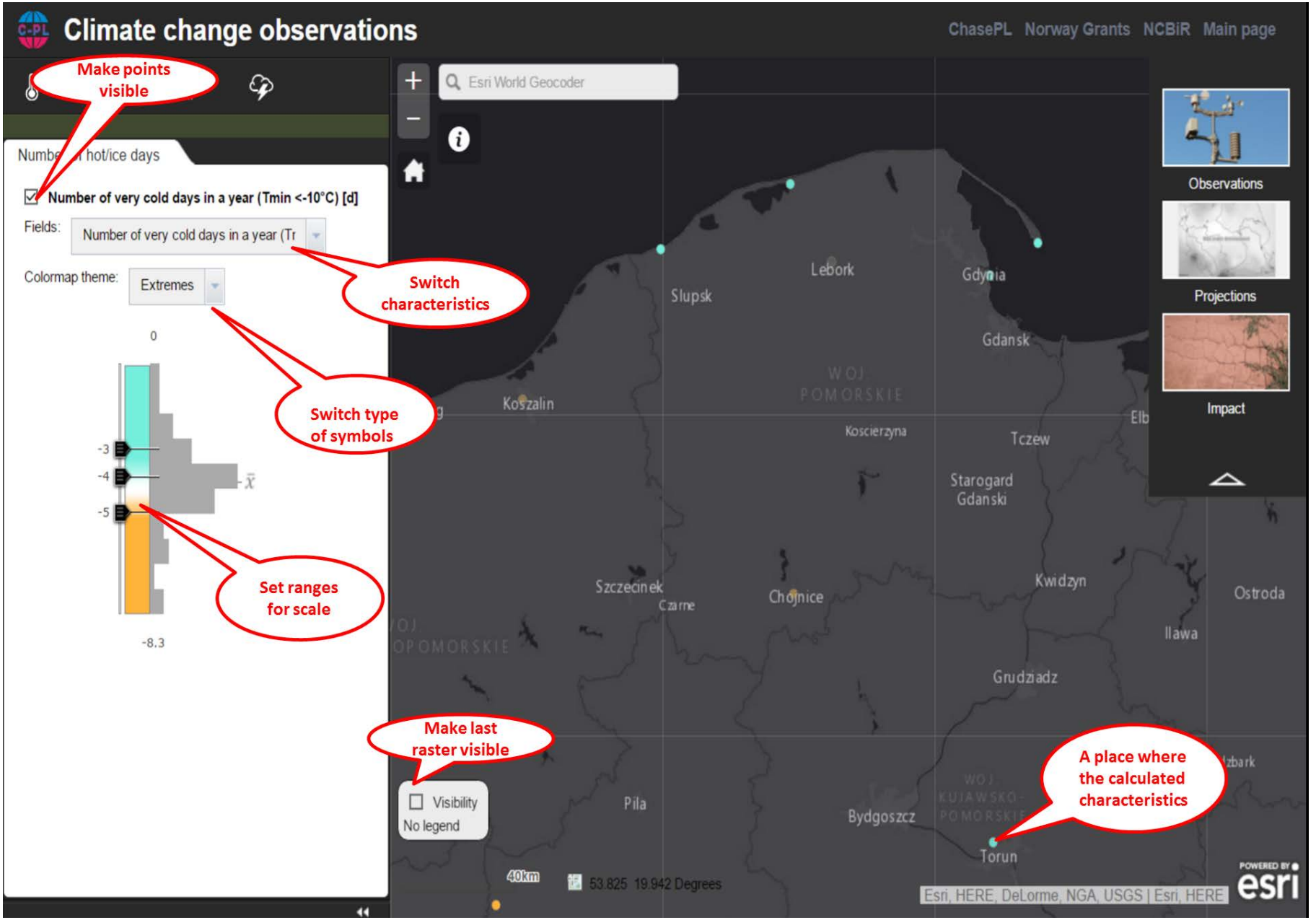
Presentation of the service

http://climateimpact.sggw.pl

Observations

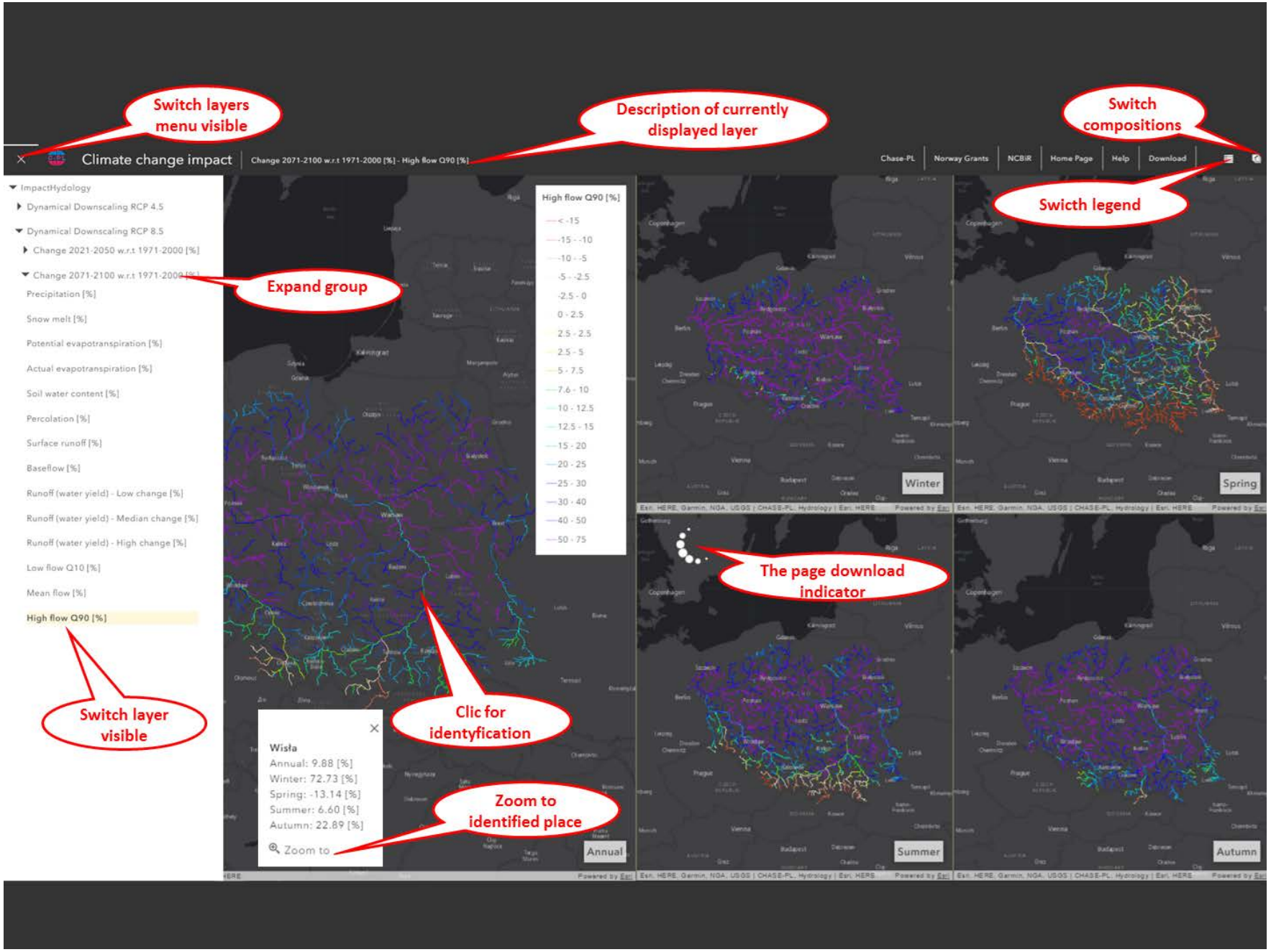


Observations exstreme



Projections

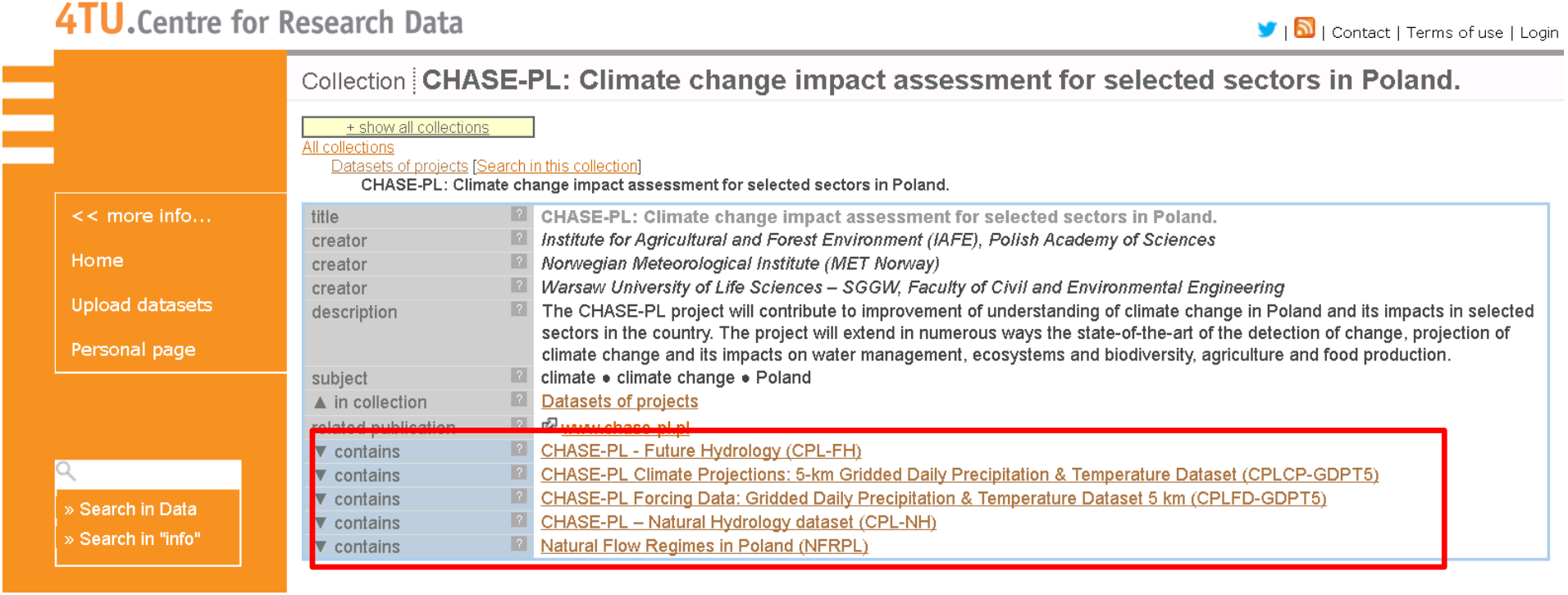
Impact


Switch layers menu visible
Description of currently displayed layer
Switch compositions
Climate change impact
Change 2071-2100 w.r.t 1971-2000 [%] - High flow Q90 [%]
Chase-PL
Norway Grants
NCBiR
Home Page
Help
Download
Swicth legend
ImpactHydology
Dynamical Downscaling RCP 4.5
Dynamical Downscaling RCP 8.5
Change 2021-2050 w.r.t 1971-2000 [%]
Change 2071-2100 w.r.t 1971-2000 [%]
Expand group
Precipitation [%]
Snow melt [%]
Potential evapotranspiration [%]
Actual evapotranspiration [%]
Soil water content [%]
Percolation [%]
Surface runoff [%]
Baseflow [%]
Runoff (water yield) - Low change [%]
Runoff (water yield) - Median change [%]
Runoff (water yield) - High change [%]
Low flow Q10 [%]
Mean flow [%]
High flow Q90 [%]
High flow Q90 [%]
< -15
-15 - -10
-10 - -5
-5 - -2.5
-2.5 - 0
0 - 2.5
2.5 - 2.5
2.5 - 5
5 - 7.5
7.6 - 10
10 - 12.5
12.5 - 15
15 - 20
20 - 25
25 - 30
30 - 40
40 - 50
50 - 75
Winter
Spring
The page download indicator
Switch layer visible
Clic for identyfication
Wisła
Annual: 9.88 [%]
Winter: 72.73 [%]
Spring: -13.14 [%]
Summer: 6.60 [%]
Autumn: 22.89 [%]
Zoom to identified place
Zoom to
Annual
Summer
Autumn

Download

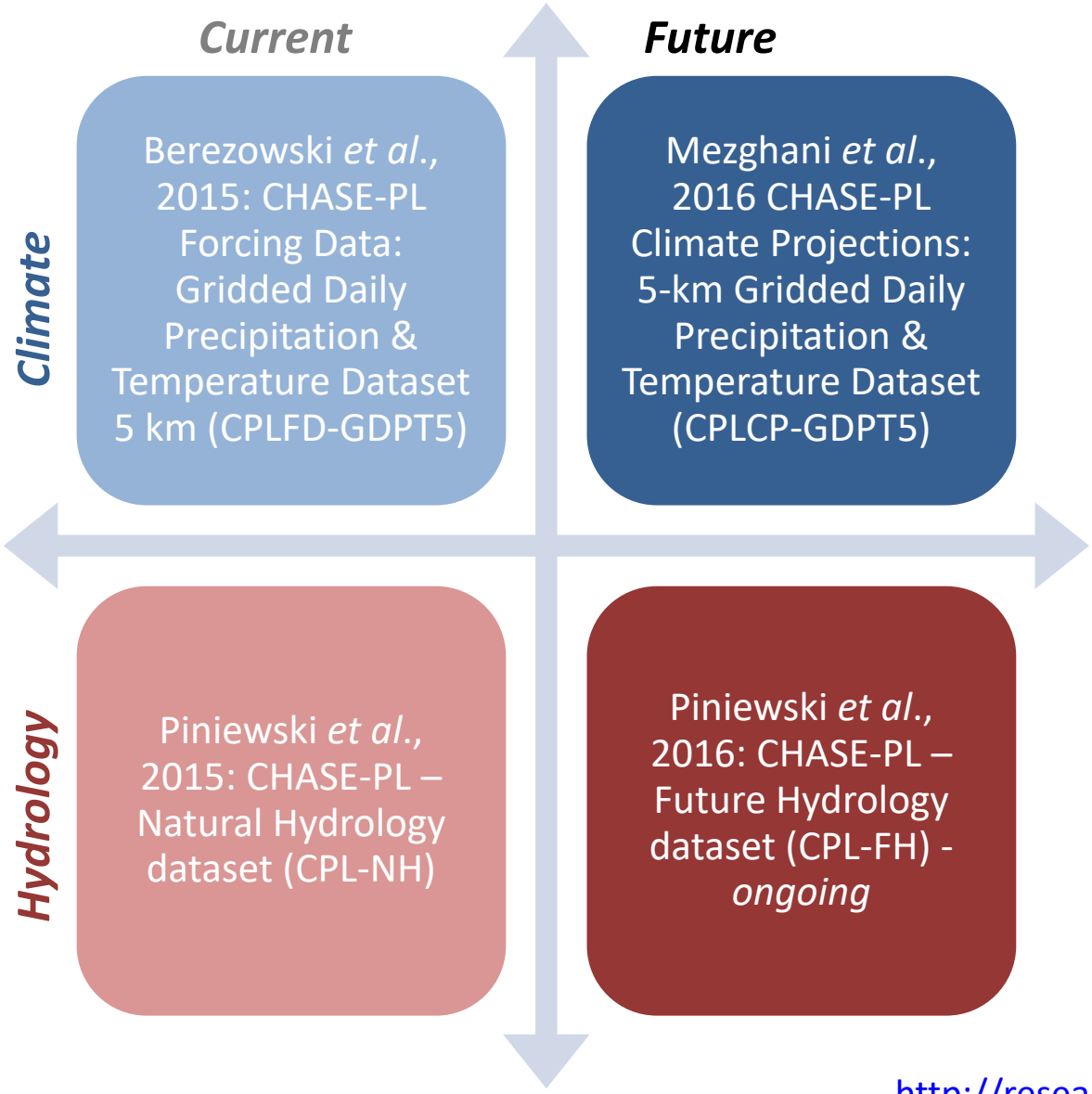
Open-access CHASE-PL datasets for researchers

- Available at 4TU Centre for Research Data (online repository) http://researchdata.4tu.nl/ (or Google search: CHASE-PL data)



- Why repository?
  - Best means of making data discoverable, reproducible, citable and reusable for general public (open access)
  - Long-lasting archiving with persistent DOI
  - Emergence of data journals

Available CHASE-PL datasets



http://researchdata.4tu.nl/

How to download part of data using OPeNDAP services

prAdjust: Grid

time: 0:1:9 y: 110:1:110 x: 123:1:123

```
standard_name: precipitation_flux
units: kg m-2 s-1
coordinates: lon lat
_FillValue: 1.0E20
missing_value: 1.0E20
```

x: Array of 64 bit Reals [x = 0..167]

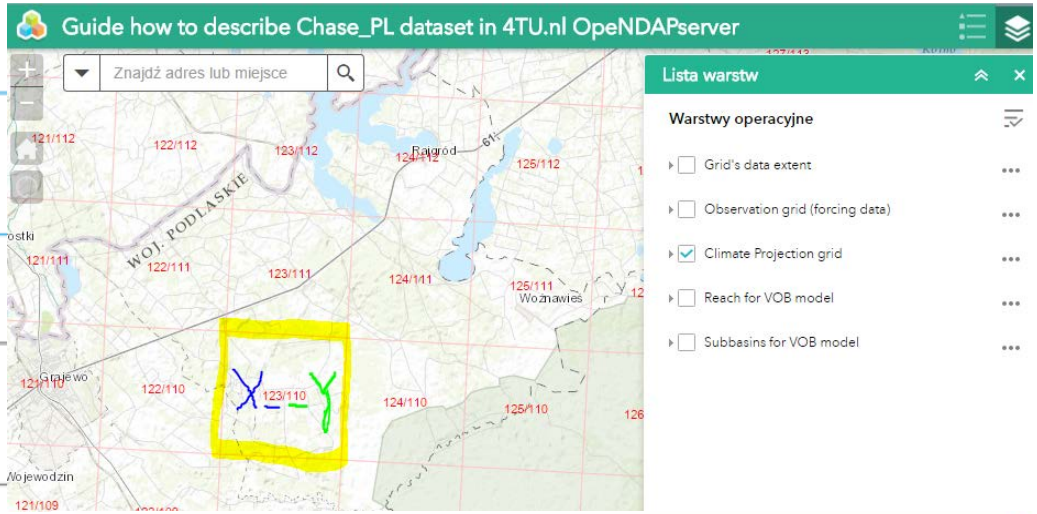
x: 123:1:123

```
units: m
long_name: original coordinates
```

y: Array of 64 bit Reals [y = 0..136]

y: 110:1:110

```
units: m
long_name: original coordinates
```




```
Dataset {
    Grid {
     ARRAY:
        Float32 prAdjust[time = 10][y = 1][x = 1];
     MAPS:
        Float64 time[time = 10];
        Float64 y[y = 1];
        Float64 x[x = 1];
    } prAdjust;
    Float64 x[x = 1];
    Float64 y[y = 1];
} data2/uuid/e940ec1a-71a0-449e-bbe3-29217f2ba31d/prAdjust_POL-05_CNRM-CERFACS-CNRM-CM5_historical_r1i1p1_CLMcom-CCLM4-8-17_v1-METNO-OMAP-ChasePlObs-1951-2013_day_19710101-20001231.nc;
```

metadane zbioru danych

```
prAdjust.prAdjust[10][1][1]
[0][0], 3.9321472E-5
[1][0], 6.7121184E-9
[2][0], 2.9387924E-5
[3][0], 2.577777E-5
[4][0], 2.548855E-5
[5][0], 0.0
[6][0], 7.158276E-6
[7][0], 0.0
[8][0], 0.0
[9][0], 4.6625414E-7
```

wartości zmiennej prAdjust - wysokości opadu

```
prAdjust.time[10]
7701.5, 7702.5, 7703.5, 7704.5, 7705.5, 7706.5, 7707.5, 7708.5, 7709.5, 7710.5
```

wartości zmiennej czasowej

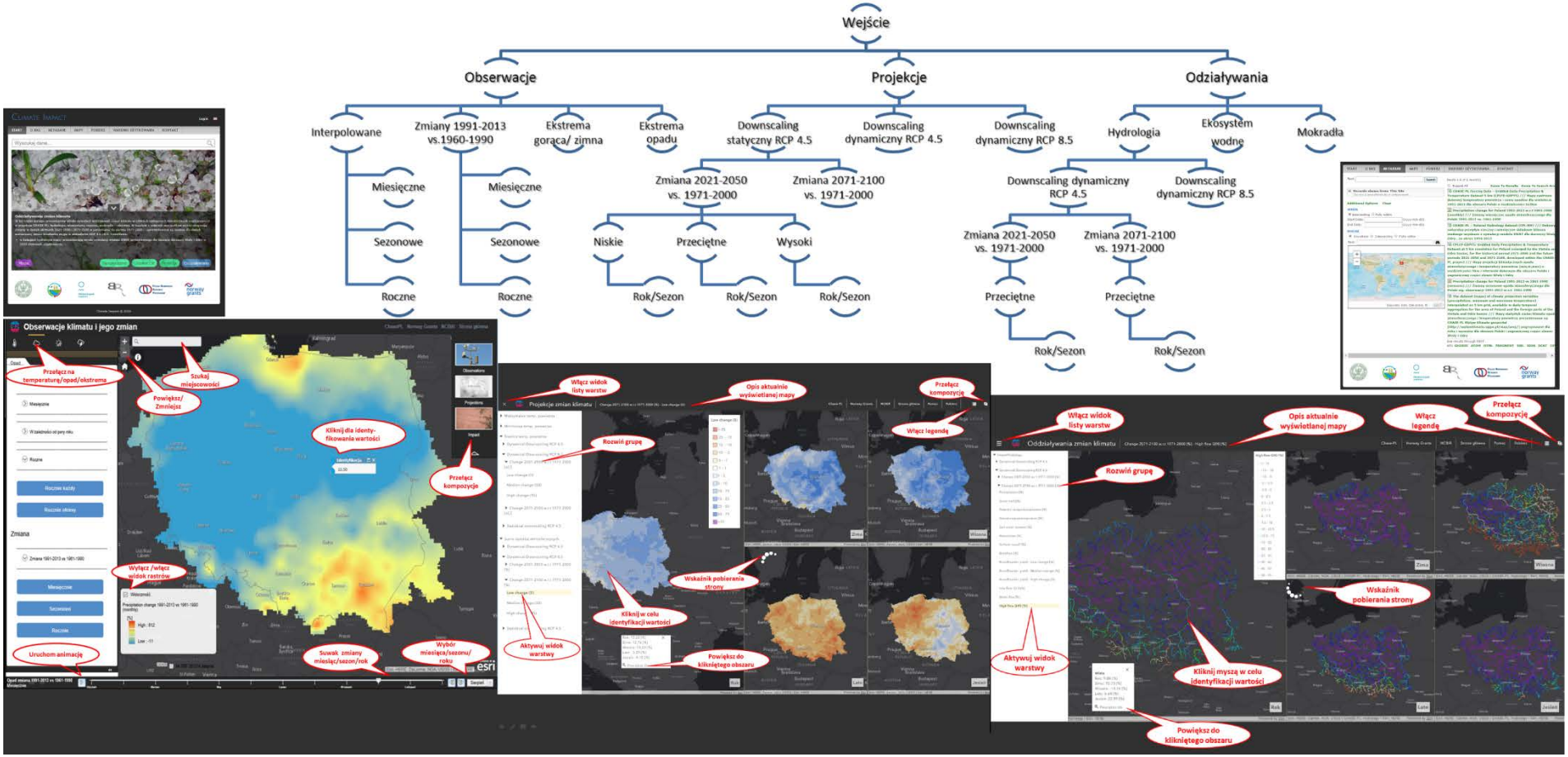
```
prAdjust.y[1]
647983.596068874

prAdjust.x[1]
738381.296218639

x[1]
738381.296218639

y[1]
647983.596068874
```

Współrzędne wybranego oczka siatki

How sciences can use the geoportal

1. Quick description of meteorological and hydrological conditions (current and future) using the IDENTIFY tool
2. Download daily data (63 years) and conduct your own statistical analyzes for any area in Poland

Thank you for your attention

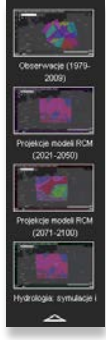


CHASE-PL

norway grants

POLISH-NORWEGIAN RESEARCH PROGRAMME

Organization of WebMap



Main page			Sub pages/Menu	Time	Area
Long name	Short name ENG	Short name PL			
1. Observetd Climate Change in Poland (1951-2013)	Observations (1951-2013)	Obserwacje (1951-2013)	Temperature, Precipitation, Hot &Cold Days, Vegetation, Extreme events	Year Season Avg for many years	
2. Projected Climate Change for Poland (2021-2050)	RCM projections (2021-2050)	Projekcje modeli RCM (2021-2050)			Poland Cachment
3. Projected Climate Change for Poland (2071-2100)	RCM projections (2071-2100)	Projekcje modeli RCM (2071-2100)			
4. Model-based assessment of climate change impacts in the Vistula and Odra basins	Hydrology: simulations and impacts	Hydrologia: symulacje i oddziaływania	Change between base & CC scenarios: - Rounoff - Outflow units - Yields for selected crops? - Biomass growth?	Year Season Avg for many years	Oder & Vistula Cachment